UCI Samueli School of Engineering | Department of Civil and Environmental Engineering

Presented By:

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Postdoctoral Researcher

Computational Environmental Sciences

University of California, Irvine

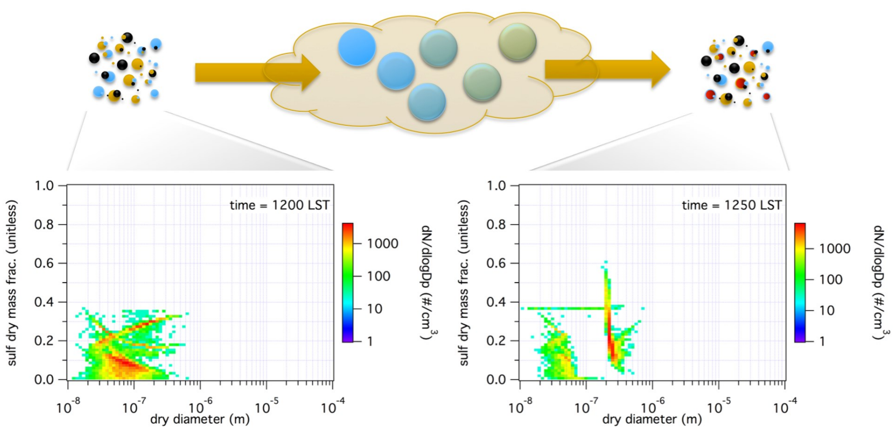
Environmental Engineering *Seminar Series*

Friday, February 5th, 2016

MDEA (McDonnell Douglas Engineering Auditorium)

1:30PM - 2:30PM

Modeling Atmospheric Aerosol Systems: Chemistry & Mixing State



Atmospheric aerosol particles reduce visibility, have adverse human health effects, and impact Earth's climate through their ability to scatter and absorb radiation and affect cloud properties. The atmospheric processing of volatile gas-phase species to form low-volatility products is an important source of atmospheric aerosol mass. However, these so-called 'secondary' aerosol species are often difficult to predict quantitatively due to, in part, the large number of intermediate species and the complicated, multi-phase reaction pathways involved. Results from two modeling efforts focused on improving predictions of secondary aerosol formation will be presented. In the first, the University of California, Irvine – California Institute of Technology (UCI-CIT) regional air quality model is used to evaluate the importance of a newly developed mechanism for aerosol formation from the oxidation of volatile aromatic hydrocarbons typically present in urban areas. In the second, a stochastic particle-resolved model (Part-MC) is updated to include an aqueous-phase chemical mechanism for the formation of aerosol mass in cloud droplets, which is an important source of sulfate and low-volatility, oxidized organics in the atmosphere. The updated model is then used to evaluate the impact of aerosol mixing state on cloud processing. Results from both studies will be discussed in relation to existing modeling techniques, and for impacts of changing emissions scenarios on secondary aerosol formation.

Matthew Dawson is a post-doctoral researcher in the Computational Environmental Sciences (CES) Laboratory at UC, Irvine, where he develops modeling techniques for atmospheric aerosol systems. He received a PhD in chemistry from UC, Irvine in the Finlayson-Pitts group, where he performed laboratory-based experiments on atmospheric particle nucleation; and a BS in chemistry from the University of Pittsburgh.

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